

Bioenergy and Agriculture

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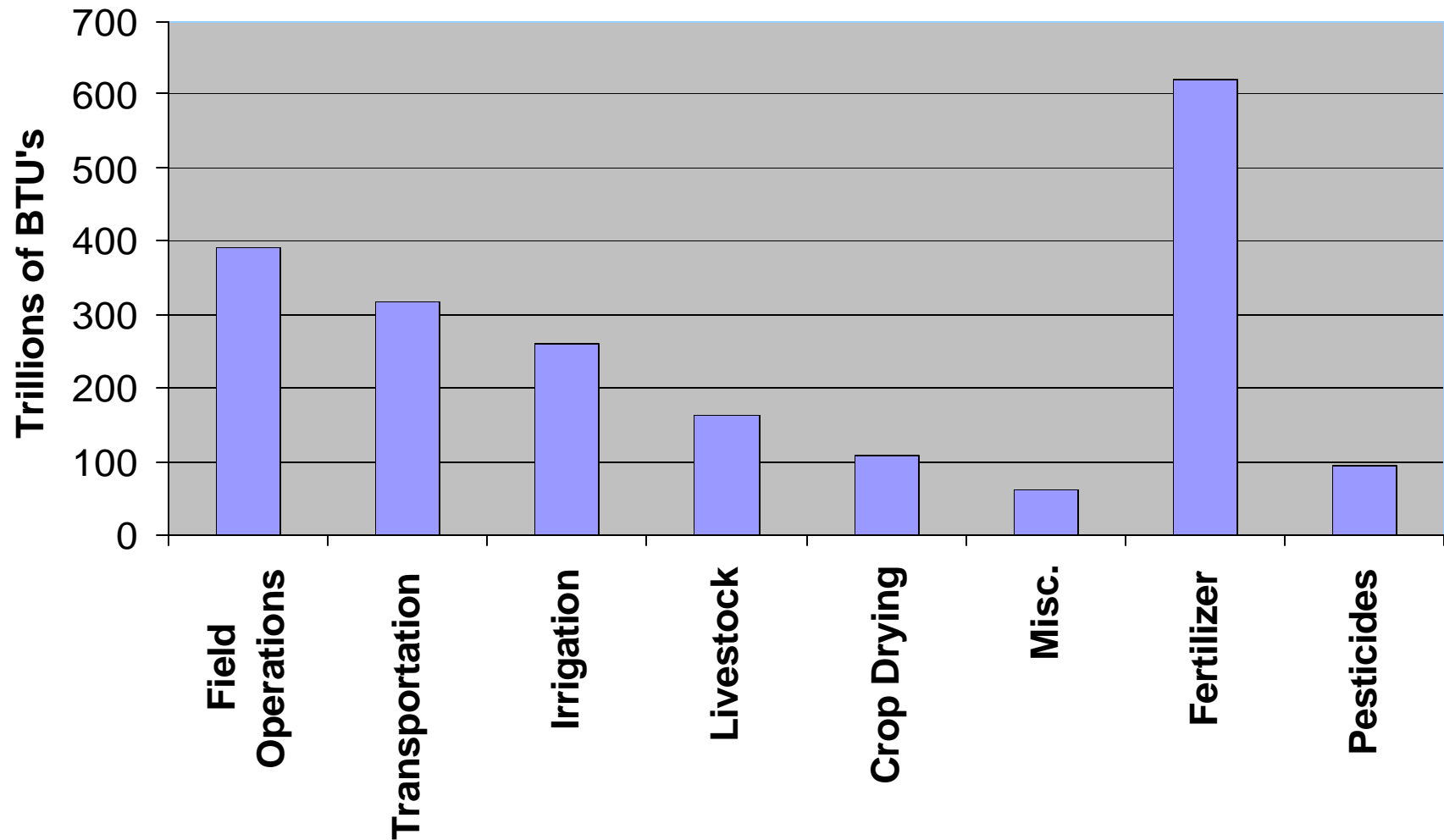


Growing the Rural Economy with Renewable Energy:

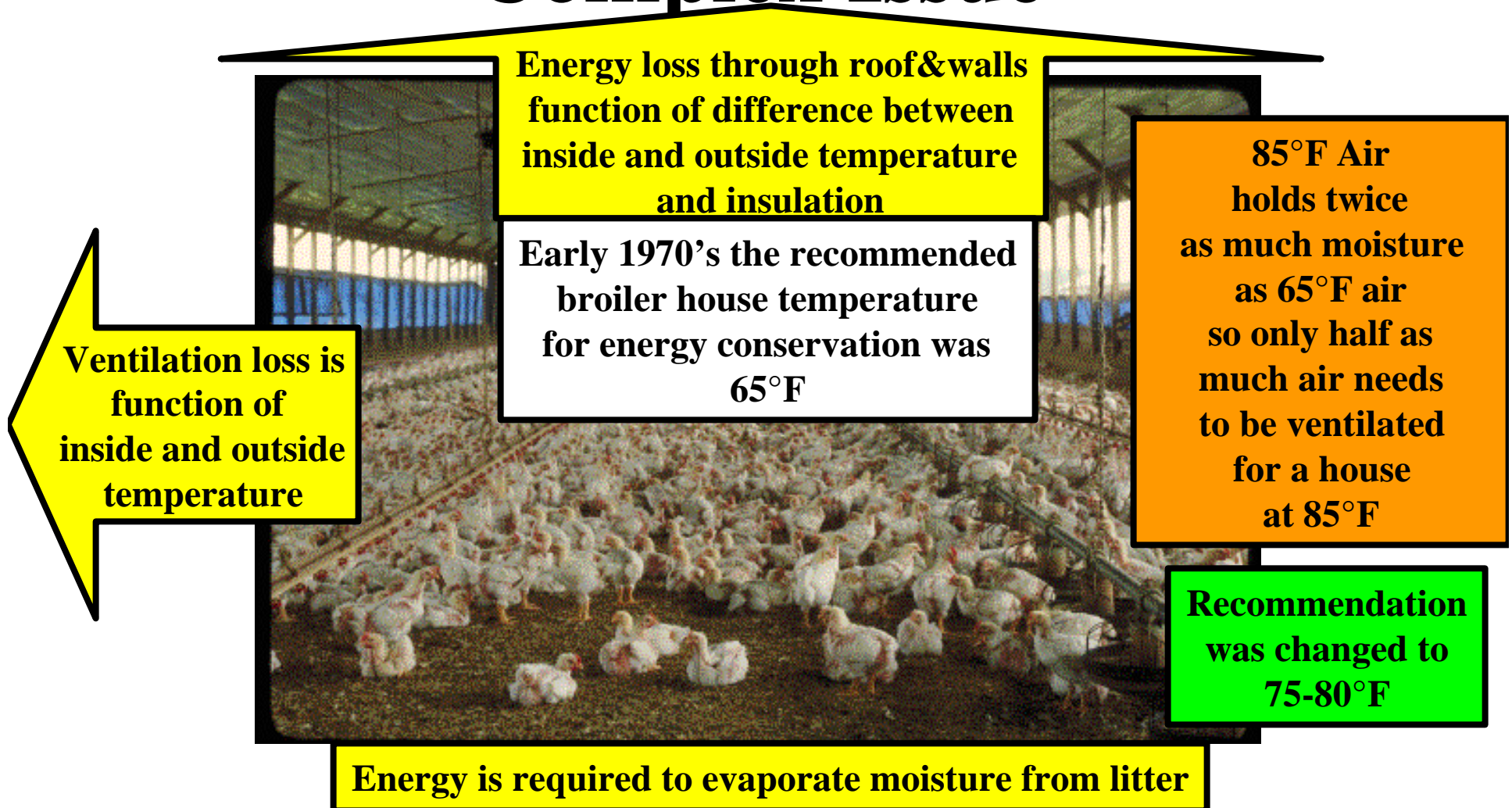
Windfarming and Bioenergy – New Crops for Missouri Farms March 6, 2003 Columbia, MO

A Little Energy Use History

US Agricultural Energy Use in 1974



Energy Conservation can be a Complex Issue



Considerable Energy Conservation and Renewable Energy Research in 1970's

**Most Will Not Be Found on the Internet,
But Much May Be
Useful Today**

Biomass Energy

Biomass, in energy terms, generally refers to agriculturally derived material used as fuel

- Wastes: livestock, forestry, municipal**
- Energy crops: trees, switchgrass, oil-seeds, grain**

Conversion Technologies

- **Direct combustion/co-firing**
- **Fermentation (ethanol)**
- **Anaerobic digestion**
- **Gasification**
- **Pyrolysis**

Direct Combustion: Example

- **Fribrowatt Group, UK**
 - **3 power plants on-line burning poultry litter**
 - **Cleaner production of electricity**
 - **Over 900,000 tons litter per year produces enough electricity for 110,000 homes**

Anaerobic Digestion: Example

- **Craven Farms, OR**
 - **800 cow dairy operation**
 - **Goals included: reduce nutrient & bacteria loads, produce electricity & heat for farm, produce electricity & fertilizer for off-farm**
 - **Total cost of project: \$318,450**
 - **Net annual income: \$40,700**
 - **Payoff in 8 years, with incentives 4 years**










Gasification: Example

- **BG Technologies, Maryland**
 - **Company produces small, modular, clean-burning, semi-automatic systems**
 - **Fuel consists of pelleted poultry litter and wood waste**
 - **Pelletizing eliminates odor & pathogens, extends shelf life, and produces fertilizer by products**
 - **Gas can be burned in an engine to generate electricity**

Pyrolysis: Example

- **Carthage, MO**
 - **Demonstration plant in conjunction with ConAgra Butterball turkey processing plant**
 - **Produce oil that can be refined for gasoline**
 - **Inputs include offal (bird processing wastes), dead birds, and poultry litter**
 - **Outputs only water**

The New Farm Bill

-  **Federal procurement of biobased products**
-  **Biorefinery development grants**
-  **Biodiesel fuel education programs**
-  **Energy audit and renewable energy development program**
-  **Renewable energy systems and energy efficiency improvements**
-  **Hydrogen and fuel cell technologies**
-  **Biomass research and development**
-  **Cooperative research and extension projects**
-  **Continuation of bioenergy program**

Federal Procurement of Biobased Products

**Requires Federal agencies to
“...give preference to such items composed
of the highest percentage of biobased
products practicable, consistent with
maintaining a satisfactory level of
competition, considering such guidelines.”**

Biorefinery Development Grants

“...assist in the development of new and emerging technologies for the use of biomass, including lignocellulosic biomass, so as to—

(1) develop transportation and other fuels, chemicals, and energy from renewable sources;

(2) increase the energy independence of the USA;

(3) provide beneficial effects on conservation, public health, and the environment;

(4) diversify markets for raw agricultural and forestry products; and

(5) create jobs and enhance the economic development of the rural economy.”

Biodiesel Fuel Education Programs

“...make competitive grants to eligible entities to educate governmental and private entities that operate vehicle fleets, other interested entities (as determined by the Secretary), and the public about the benefits of biodiesel fuel use.”

Energy Audit and Renewable Energy Development Program

*“...make competitive grants
to eligible entities to carry out a
program to assist farmers, ranchers,
and rural small businesses in
becoming more energy efficient
and in using renewable energy
technology and resources.”*

Renewable Energy Systems and Energy Efficiency Improvements

*“...shall make loans, loan guarantees,
and grants to farmers, ranchers, and
rural small businesses to—
(1) purchase renewable energy
systems; and
(2) make energy efficiency
improvements.”*

Hydrogen and Fuel Cell Technologies

“...shall cooperate in the application of hydrogen and fuel cell technology programs for rural communities and agricultural producers.”

Biomass research and development

“...amends Biomass Research and Development Act of 2000 (7 U.S.C. 7624 note; Public Law 106–224)”

Authorizes funding of \$50+ million per year

Cooperative Research and Extension Projects

“—Subject to the availability of appropriations, the Secretary, in cooperation with departments and agencies participating in the U.S. Global Change Research Program (which may use any of their statutory authorities) and with eligible entities, may carry out research to promote understanding of—

(A) the flux of carbon in soils and plants (including trees); and

(B) the exchange of other greenhouse gases from agriculture.”

Continuation of Bioenergy Program

“...shall continue the program under part 1424 of title 7, Code of Federal Regulations (or any successor regulation), under which the Secretary makes payments to eligible producers to encourage increased purchases of eligible commodities for the purpose of expanding production of such bioenergy and supporting new production capacity for such bioenergy.”

Bio-Fuel Cycling

**Carbon
Recycling**

Animal Production

Animal Manure

**Carbon
Sinks**

Agroforestry

**Cellulosic
Biomass**

Pelleted Biomass

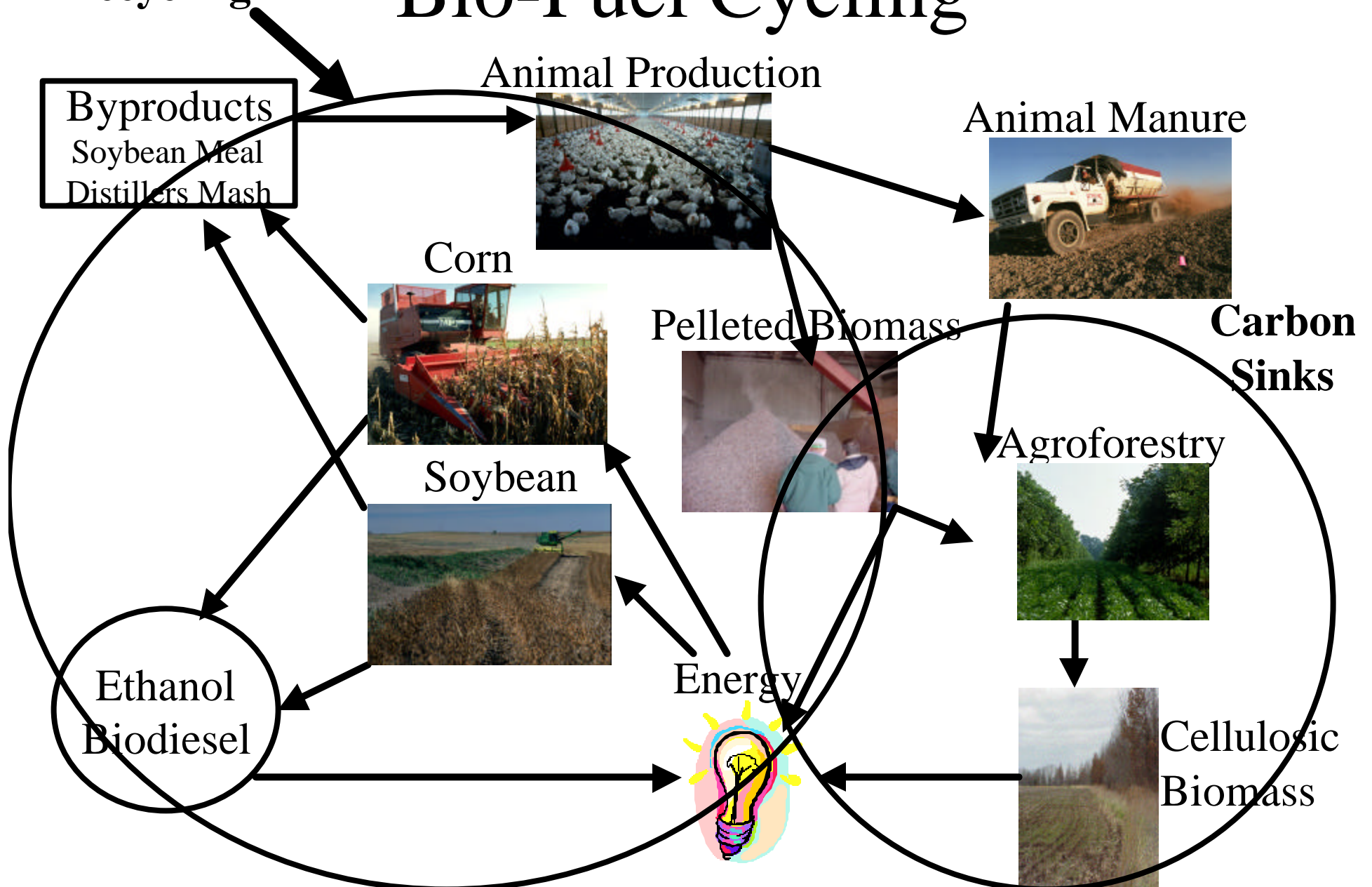
Energy

Corn

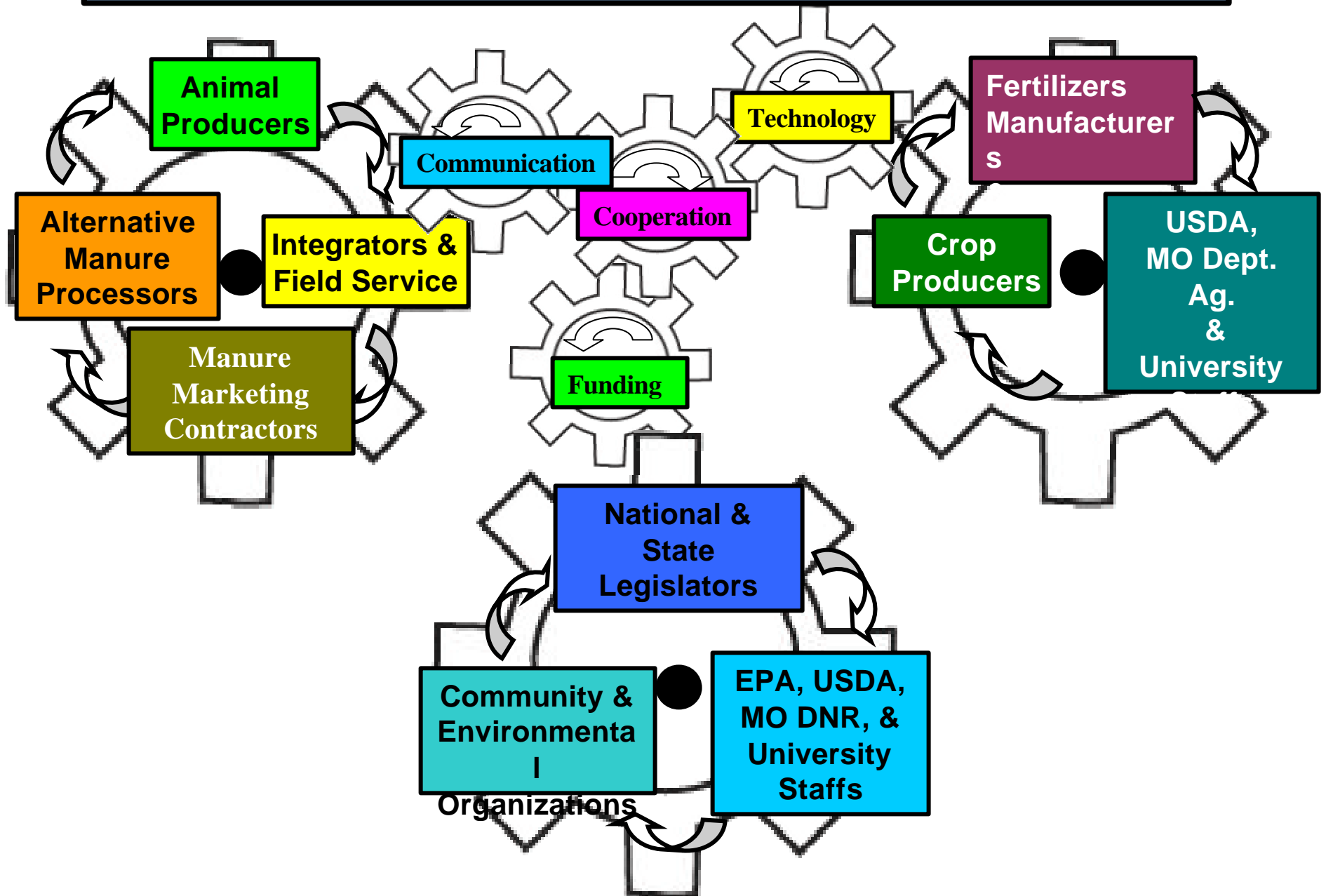
Soybean

Byproducts
Soybean Meal
Distillers Mash

**Ethanol
Biodiesel**



Holistic Solutions Require Many Cooperators



Bioenergy – Agriculture's Product of the Future



QUESTIONS?